

## CLAIMS

What is claimed is:

1. An imaging system comprising:
  - a) a magnetic resonance imaging (MRI) system having a MRI field of view (FOV) and comprising a magnet for generating a static magnetic field; and
  - b) an x-ray fluoroscopy system having an x-ray field of view (FOV) and comprising an x-ray source in the presence of said static magnetic field, said x-ray source comprising:
    - an x-ray tube for generating x-rays, said x-ray tube having an anode and functioning by accelerating an electron beam onto an anode target; and
    - means for steering said electron beam onto said anode target;
2. The imaging system of claim 1 wherein said MRI FOV and said x-ray FOV are substantially coincident.
3. The imaging system of claim 1 wherein said means for steering said electron beam comprises electrostatic plates.
4. The imaging system of claim 3 wherein said means for steering said electron beam further comprises a controller for setting an electric potential of said electrostatic plates in dependence on said static magnetic field.
5. The imaging system of claim 1 wherein said means for steering said electron beam comprises at least one electromagnet adjacent to said x-ray tube.
6. The imaging system of claim 5 wherein said means for steering said electron beam further comprises a controller for setting a current in said electromagnet in dependence on said static magnetic field.
7. The imaging system of claim 1 wherein said means for steering said electron beam comprises a magnetic material.

- 1 8. The imaging system of claim 7 wherein said magnetic material is  
2 adjacent to said anode on a side opposite said electron beam.
- 1 9. The imaging system of claim 7 wherein said magnetic material is an  
2 envelope of magnetic material around said x-ray tube.
- 1 10. The imaging system of claim 1, further comprising a feedback system in  
2 communication with said means for steering said electron beam.
- 1 11. The imaging system of claim 10 wherein said feedback system  
2 comprises means for measuring a location of a focal spot of said  
3 electron beam on said anode target.
- 1 12. The imaging system of claim 11 wherein said means for  
2 measuring said location of said focal spot comprises a digital  
3 imager.
- 1 13. The imaging system of claim 11 wherein said means for  
2 measuring said location of said focal spot comprises a  
3 monitoring array adjacent to said anode for measuring an x-ray  
4 emission profile of said anode target.
- 1 14. The imaging system of claim 11 wherein said means for  
2 measuring said location of said focal spot comprises slits  
3 surrounding said electron beam for measuring a current through  
4 said slits.
- 1 15. The imaging system of claim 11 wherein said means for  
2 measuring said location of said focal spot comprises an infrared  
3 sensor adjacent to said anode for measuring a heat distribution  
4 of said anode.

- 1 16. The imaging system of claim 1 wherein said x-ray tube is positioned so that  
2 said electron beam is substantially parallel to said static magnetic field.
- 1 17. The imaging system of claim 1 wherein said x-ray fluoroscopy system  
2 comprises components, at least some of said components being non-magnetic,  
3 whereby said static magnetic field is not substantially disturbed by said x-ray  
4 fluoroscopy system.
- 1 18. An imaging method comprising:  
2 acquiring a magnetic resonance image of an object located within a field of view  
3 (FOV) of a magnetic resonance imaging (MRI) system; and  
4 acquiring an x-ray fluoroscopic image of said object within a FOV of an x-ray  
5 fluoroscopy system having an x-ray tube in the presence of a static magnetic  
6 field of said MRI system, comprising generating x-rays by accelerating an  
7 electron beam onto an anode target of said x-ray tube and steering said electron  
8 beam onto said anode target.
- 1 19. The imaging method of claim 18 wherein said MRI FOV and said x-ray FOV  
2 are substantially coincident.
- 1 20. The imaging method of claim 18 wherein steering said electron beam  
2 comprises electrostatically deflecting said electron beam using electrostatic  
3 plates.
- 1 21. The imaging method of claim 18 wherein steering said electron beam  
2 comprises electromagnetically deflecting said electron beam using at least one  
3 electromagnet adjacent to said x-ray tube.
- 1 22. The imaging method of claim 18 wherein steering said electron beam  
2 comprises positioning a magnetic material adjacent to said electron beam.
- 1 23. The imaging method of claim 22 wherein said magnetic material is  
2 positioned adjacent to said anode on a side opposite said electron beam.

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- 1 24. The medical imaging method of claim 22 wherein said magnetic  
2 material is an envelope of magnetic material positioned around said x-  
3 ray tube.